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STATUS, INVENTORY, DATA MANAGEMENT AND SUPPLY SUPPORT SYSTEM (S--ETC(U)
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STATUS, INVENTORY, DATA MANAGEMENT AND SUPPLY SUPPORT SYSTEM (SIDMS): DATA AND EVALUATION

by

Ray R. Boyce

NAILSC FINAL REPORT 05-41

30 September 1977

DEPARTMENT OF THE NAVY
NAVAL AVIATION INTEGRATED LOGISTIC SUPPORT CENTER
PATUXENT RIVER, MARYLAND 20670

IN REPLY REFER TO

420-04-41
30 September 1977

From: Commander, Naval Aviation Integrated Logistic Support Center, Patuxent River, MD 20670
To: Commander, Naval Material Command (MAT-041), Washington, D.C. 20360
Via: Commander, Naval Air Systems Command (AIR-411), Washington, D.C. 20361

Subj: Improved Repairable Management Afloat; Status, Inventory, Data Management and Supply Support System (SIDMS)

Encl: (1) Status, Inventory, Data Management and Supply Support System: Data and Evaluation
(2) Status, Inventory, Data Management and Supply Support System Evaluation Plan

1. Enclosure (1) reports the results of monitoring and assessing the performance of the Status, Inventory, Data Management and Supply Support System installed aboard the USS JOHN F. KENNEDY during her deployment to the Mediterranean in 1977. Prior to deployment, it was anticipated that use of this automatic data processing system would enhance the capability of the Aviation Intermediate Maintenance Department to support fleet operations.

2. Enclosure (2) is an evaluation plan which was prepared prior to deployment and presented to the representative from the Naval Aviation Integrated Logistic Support Center as a data collection guide to be followed as closely as possible while monitoring performance of the automatic data processing computer system.

Leo L. Hamilton
LEO L. HAMILTON

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

In April 1976, the Commanding Officer of the USS JOHN F. KENNEDY requested that an Aviation Intermediate Maintenance Department (AIMD) Status, Inventory and Data Management System (SIDMS) be installed aboard the USS JOHN F. KENNEDY. This letter was favorably endorsed by the Commander, U.S. Naval Air Forces, Atlantic Fleet. Subsequently the Chief of Naval Material (MAT-041) negotiated a contract with PRD Electronics, Inc., to provide the SIDMS to the USS KENNEDY. The task was later expanded to include supply support features. The Naval (Continued)

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Block 20. (Continued)

Aviation Integrated Logistic Support Center (NAILSC) was tasked to monitor the installation of the SIDMS and to assess its value.

SIDMS is a data retrieval system designed to provide the AIMD Production Control Shop and the serviced work centers with current and accurate information related to Production Control Status, Equipment or Parts Inventories and Personnel Status. The system also provides the automatic cross reference from part number to National Stock Number (NSN) and automatic printing of DD Form 1348 requisitions from AIMD and the squadrons. Storage, retrieval and update of files is accomplished in an interactive environment using functional mnemonics entered via a cathode ray tube and keyboard. Hard copy of selected data is available upon request via line or auxiliary printers.

The findings of the evaluation were that SIDMS is a valuable asset that should be kept aboard the USS KENNEDY. It needs to be provided with logistic support and should be modified before being placed upon other carriers even though the current configuration is certainly adequate for shore bases. Recommendations consistent with these findings are:

1. Continue debugging the AIMD management routines until all minor deficiencies are eliminated.

2. Replace the 60 lines per minute line printer with one that prints at least 200 lines per minute.

3. Modify SIDMS to increase the transaction speed by changing the method of polling users or incorporating a communications executive type program.

4. Replace the current magnetic tape transport unit with a new and better model.

5. Install a second magnetic tape transport unit and add two disks to provide a back-up data base.

6. Negotiate a logistic support contract with the contractor to provide either hardware repair and software modifications capability or appropriate training of naval personnel to provide such capabilities through the next Mediterranean deployment of the USS KENNEDY.

7. Either procure or continue leasing the equipment aboard the USS KENNEDY and enter negotiations to provide the recommended changes and logistic support.

In performance of this evaluation which occurred aboard the USS KENNEDY between the dates of 9 January 1977 and 1 August 1977, several supporting activities were involved. These include:

1. The Naval Material Command Headquarters as the Developing Agency with responsibility for administering all contractual requirements and providing any necessary high-level support.

2. Commander, Naval Aviation Integrated Logistic Support Center, who, as the Prosecuting Agency, was responsible for the prosecution of the project.

3. Commanding Officer, USS JOHN F. KENNEDY, who was responsible for the conduct of the tests at sea.

STATUS, INVENTORY, DATA MANAGEMENT, AND SUPPLY SUPPORT SYSTEM (SIDMS): DATA AND EVALUATION

FINAL REPORT

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS

AIMD	Aviation Intermediate Maintenance Department
AVCAL	Aviation Consolidated Allowance List
AWM	Awaiting Maintenance
AWP	Awaiting Parts
AWS	Awaiting Status
BCM	Beyond Capability of Maintenance
BUNO	Bureau Number
CCS	Component Control Section
CET	Contractor Engineering Technician
COG	Cognizance Symbol
COMNAILSC	Commander, Naval Aviation Integrated Logistic Support Center
CPU	Central Processing Unit
CRT	Cathode Ray Tube
CV	Carrier
DD	Defense Department
FSCM	Federal Supply Code Manufacturers
GSE	Ground Support Equipment
ICRL	Individual Component Repair List
IMRL	Individual Material Requirements List
JCN	Job Control Number
MAF	Maintenance Action Form
MMM	(3-M) - Aviation Maintenance Material and Management
MOS	Multiprogramming Operating System
MTTU	Magnetic Tape Transport Unit
NC	Not Carried
NFE	Not Fully Equipped
NIIN	National Item Identification Number
NIS	Not In Stock
NLA	No Location Assigned
NORS	Not Operationally Ready Supply
NSN	National Stock Number
OR	Operationally Ready
PME	Precision Measuring Equipment
PMS	Planned Maintenance System
PECD	Received
RFI	Ready for Issue

SIDMS	Status, Inventory, Data Management and Supply Support System
SMIC	Special Material Identification Code
SRS	Supply Response Section
SUADPS	Shipboard Uniform Automated Data Processing Section
TAD	Temporary Additional Duty
TEC	Type Equipment Code
TOL	Tailored Outfitting List
USS	United States Ship
VAST	Versatile Avionic Shop Test
VIDS	Visual Information Display System
WIP	Work In Progress
WUC	Work Unit Code

REFERENCES

a. CNO ltr Ser 51D/119035 of 28 May 1975. "Improved Aviation Repairables Management Afloat Program." Commission of Study.

b. CNO ltr Ser 41D/119093 of 26 Jul 1975. "Improved Aviation Repairables Management Afloat." Prototype Milestone Plan.

c. NAVMAT ltr 0411:WPS of 17 Dec 1975. "Improved Aviation Repairables Management Afloat." USS SARATOGA Test Manual.

d. USS SARATOGA ltr CV60:JES:dfo Ser 05842 of 27 May 1976. "Improved Aviation Repairable Management Afloat Program." Progress Report on USS SARATOGA Improved Aviation Repairables Management Afloat Program.

SECTION A

PURPOSE OF THE PROJECT

A1. Purpose. The purpose was to access the value of the Status, Inventory, Data Management and Supply Support System (SIDMS).

A2. General Objectives. The general objectives were to:

a. Measure capability of the system to provide timely management reports to the Aviation Intermediate Maintenance Department (AIMD) Officer, Production Control, Material Control, Work Centers, Supply Response Section (SRS) and squadron maintenance officers.

b. Measure the worth of benefits received.

c. Measure the cost of the system.

d. Measure the impact on operational parameters such as Operationally Ready (OR) rate, Not Operationally Ready Supply (NORS) rate, sorties flown, sortie rate, flight hours, Not Fully Equipped (NFE) rate, etc.

e. Measure the reliability and maintainability from both a hardware and a software standpoint.

A3. Limitations to Scope. Scope is largely limited to objectives a, b, and e above. One reason for this limitation is that appropriate elements of cost were not available. Another reason is that no pure line of influence between SIDMS and the operational parameters was found. Also, objective b was more or less confined to a determination of where SIDMS saves time and how this saved time is converted to enhanced performance.

SECTION B

DESCRIPTION OF MATERIAL

B1. General. Leased from and assembled by PRD Electronics, Inc., SIDMS is the AIMD Status, Inventory, Data Management and Supply Support System (SIDMS) installed aboard the USS JOHN F. KENNEDY. Its purpose is to provide instantaneous information on all repairables in the repair cycle and to streamline the requisition process, including automatic cross reference from part number to National Stock Number (NSN) and automatic generation of DD Form 1348 requisitions from squadrons and AIMD Work Centers in SRS. Additionally SIDMS generates all required management reports, keeps track of rotatable pool assets and provides inventory control of all Precision Measuring Equipment (PME), Ground Support Equipment (GSE), Individual Material Requirements List (IMRL) and Tailored Outfitting List (TOL) items by serial number. Storage, retrieval and update of files are accomplished in an interactive environment using functional mnemonics entered via the Cathode Ray Tube (CRT) and keyboard. Hard copy of selected data is available upon request via the line printer or auxiliary printers.

B2. System Equipments. The following equipments comprise the system and are located in the areas indicated.

a. AIMD Material Control

CRT Terminal PRD Mod 1210-4010

Auxiliary Printer PRD Mod 1210-5020

Video Monitor PRD Mod 1210-6010

Central Procuring Unit (CPU) PRD Mod 1210-1000 with I/O and 64K MOS Memory (16 bit words)

Two Disk Drivers and two disks with 11.7 million 16 bit word storage capacity each

Magnetic Tape Transport Unit 556/880 bpi, 32 ips

Line Printer 164 cps, 132 col

Card Reader 300 cpm

Key Punch

b. Supply Response Section

CRT Terminal PRD Mod 1210-4010

Form Printer PRD Mod 1210-5030

c. Awaiting Parts Section

CRT Terminal PRD Mod 1210-4010

d. AIMD Officers' Office

CRT Terminal PRD Mod 1210-4010

Auxiliary Printer Hewlett Packard Mod 9866A

e. Squadron Material Offices (10)

CRT Terminal PRD Mod 1210-4010

Auxiliary Printer PRD Mod 1210-5020

B3. Weight and Dimensions of Major Equipment. Table I contains weights and dimensions of major units in SIDMS. As the units are neither excessively large nor heavy, the installation has no detrimental effect upon the habitability of the spaces or the operation of the AIMD or the level of manning.

TABLE I

WEIGHTS AND DIMENSIONS OF MAJOR UNITS IN SIDMS

UNIT	DIMENSIONS (Inches)			WEIGHT (Pounds)
	WIDTH	HEIGHT	THICKNESS	
CPU	48	76	30	570
Disk Driver	30	41	24	150
Key Punch	31	38	29	170
CRT Terminal	21	15	24	38
Video Monitor	23	19	18	65
Line Printer	27	18	30	118
Card Reader	12	20	15	30
Cable	.18	.18	26000	1220

B4. System Software.

B4.1 General Discussion. The software consists of numerous programs which provide 46 displays for updating of files or review of data and the ability to produce reports on call. Reports include Individual Component Repair List (ICRL), IMRL, TOL, PME, Units Under Repair, Requisition Document Status, Personnel Status, Rotatable Pool Items, Test Bench Status, Ready for Issue (RFI)/ Beyond Capability of Repair (BCR) Items, Daily Production Status Reports and Monthly Summary. In fact, almost any desired report can be obtained by varying the sort parameters, e.g., A799, RFI percent, BCM percent, Type Equipment, Work Center, Turn Around Time, etc. Data stored in the memory include:

a. Thirty-six thousand items of Aviation Consolidated Allowance List (AVCAL), including Part Number, NSN, Price, Type Equipment Code (TEC), Special Material Identification Code (SMIC), Cognizance Symbol (COG), Federal Supply Code Manufacturers (FSCM), Nomenclature and four shipboard storeroom locations of the item.

b. All PME items including serial number, custodian, upcoming calibration date and present status.

c. All GSE items

d. IMRL and TOL

e. Technical publications including publication number or tape number, basic date, date of latest change and work center locations.

f. All personnel of the AIMD who are identified by name, rank, rate, duty section, activity, work center or status such as leave, Temporary Additional Duty (TAD), special details, etc.

B4.2 Specific Software Functions and Use.

B4.2.1 Supply Functions. Supply functions include:

a. SQUADRON DD FORM 1348 - GENERATION. A CRT terminal with keyboard and teletype printer is located in each squadron material control space. The requisition form printer is located in the Supply Department's SRS space. To order a part, the squadron user calls the program to display a fill-in-the-blank format on his terminal. He inserts the part number required along with his squadron designation, Job Control Number (JCN), Bureau Number (BUNO), the quantity required and the document number. The SIDMS System locates the part number in the AVCAL data base, picks up the corresponding NSN, Price, TEC, SMIC, COG, FSCM, Nomen-

clature and storeroom location and automatically prints a DD Form 1348 in SRS containing all the required information. Upon printing this requisition, the SIDMS System sends a signal back to the squadron material control terminal that the transaction is complete. When the Transaction Complete message is received on the squadron terminal, print command is given and the teletype printer duplicates the requisition information displayed on the terminal, thereby furnishing a hard copy for file by the squadron.

All opportunity for error due to communication, teching, and typing has been eliminated.

b. AIMD WORK CENTER DD FORM 1348 GENERATION. A CRT terminal is located in each AIMD Work Center and the part-ordering process is essentially the same as that for squadrons. However, in addition to printing the requisition, information is extracted from the requisition data to create an AIMD Material Control Register entry. The SIDMS System locates the JCN against which the part is ordered and stores the document number and the part number of the parts requisitioned, along with the JCN. This feature provides instant information to management on units under repair that are awaiting parts.

B4.2.2 AIMD STATUS AND DATA MANAGEMENT FUNCTIONS. The production output of the AIMD represents the major source of repairable items onboard the carrier. It is imperative that production effort be effectively managed to ensure that non-RFI units are scheduled and repaired according to their impact on operational readiness. The material resources management of SIDMS has been designed with this overall objective to provide management with real-time visibility on the status and location of all items in the repair cycle. In a similar manner, the rotatable pool levels which can impact aircraft support are monitored.

a. MASTER PRODUCTION FILE. The SIDMS memory was initially loaded with a data base consisting of a modified version of the AIMD ICRL. Additional data were added to the ICRL data base to indicate whether the item is a rotatable pool item, the quantity allowed in the pool, whether the item is a test bench component and also the number of times this part number has been inducted for repair. In addition, the item is assigned a work center/line number for unique identification. The Master Production File can be updated as required via keyboard entry at the CRT terminal in the AIMD Production Control space.

b. UNITS UNDER REPAIR REGISTER. When a non-RFI unit is inducted for repair, the JCN assigned by the squadron appearing on the VIDS/MAF is entered into the SIDMS System via the Production Control terminal. The proper program is called using the part number of the non-RFI repairable. The SIDMS System locates the part number

in the Master Production File and displays the corresponding information on the CRT. The induction date is automatically inserted, the status is automatically established as AWM and blanks are provided for insertion of the identifying JCN. The information is then stored in the Units Under Repair Register awaiting further developments. When the item is put into work, the appropriate work center calls the proper display using the identifying JCN and changes the status from AWM to Work In Process (WIP).

c. TEST BENCH REGISTER. All test benches are identified by an alpha character in the fourth position of the work center/ line number. A VIDS/MAF written on a test bench is entered into the Test Bench Register just as another repairable; but those items are available on a separate report for management purposes.

d. MATERIAL CONTROL REGISTER. When work has progressed to the point that a part is required to complete the repair, the work center orders the part. During the creation of the Material Control Register entry from information on DD Form 1348, the status of the affected JCN is automatically changed to Awaiting Parts (AWP). Also, the document is automatically changed to Awaiting Status (AWS) and the JCN location is set at No Location Assigned (NLA). This complete Material Control Registry entry then appears automatically on the CRT terminal in SRS as a reminder that action must be taken on the corresponding DD Form 1348. The entry will remain displayed there until a change is made to the document status from AWS to either of the following: Not Carried (NC), Not-In-Stock (NIS), or ISSUED. When the status change is made by SRS, the work center knows to deliver the non-RFI repairable to the AWP (if the new status is ISSUED). In this way, all concerned have instant access to the information and the need for status information to be passed by telephone or other method of transmission is eliminated.

When the SRS changes the status of a document, the Material Control Register entry disappears from the terminal and automatically appears on the CRT terminal in the AWP space, if the new status is NC or NIS. This tells the AWP personnel to expect a non-RFI unit, repairable to be delivered. Upon receiving the non-RFI unit, the AWP personnel change the storage location information from NLA to the assigned bin or shelf number and the Material Control Register entry disappears from the terminal. Upon receipt of status information of off-ship requisitions, the NC or NIS status is changed to reflect the appropriate information. This negates the requirement for punching cards and printing lists of status information to distribute to AIMD.

As a part is received, it is delivered to AIMD Material Control and

the status is immediately changed to received (RECD). Upon changing the status of an outstanding requisition to RECD, the Material Control Register entry is obliterated and the status of the JCN is automatically changed back to AWM. In the case where multiple parts are ordered against one repairable, the receipt of the last and final part must be entered before the Material Control Register entry can be obliterated and the status of the JCN is automatically changed back to AWM. In the case where multiple parts are ordered against one repairable, the receipt of the last and final part must be entered before the Material Control Register entry can be obliterated.

e. CANNIBALIZATION. When a cannibalization action occurs, it is recorded using the appropriate display. The program is called using the document number to be transferred. The SIDMS System searches the files, displays the JCN to be RFI'd and presents blanks for JCN to which the document is to be transferred. Upon entering the JCN, the system automatically makes the change.

f. RFI/BCM REGISTER. The productive output of the AIMD is recorded in a cumulative file for a period of 30 days. Since the effectiveness of the AIMD is measured by its productive output, a great deal of attention was given to this function. The information in the RFI/BCM Register parallels information passed on to the 3-M System; but it is generated without additional work and all information on items produced in the past month is available on call.

As each item is processed from the AIMD, its serial number, the malfunction code, the action taken code and the manhours expended are entered on the proper display. Turn around time is automatically computed and the item is stored in the RFI/BCM cumulative file. At the end of each month, this file is sorted in a variety of ways to produce reports and almost any desired report can be obtained by varying the sort parameters.

When all required reports are generated, the RFI/BCM file is dumped on tape and preserved for later use. All tapes for a complete deployment can be combined to produce complete cruise reports.

SECTION C

PREVIOUSLY KNOWN DATA

C1. Reference (a) commissioned a study to develop a Repairables Management Plan and Performance Measurements System for CVs which would help improve readiness. Reference (b) committed resources to conduct a prototype evaluation of the plan on the USS SARATOGA and approved preliminary recommendations. Reference (c) provided the details of the management plan and performance measurements system for implementation on the USS SARATOGA. In particular, this reference addressed manpower levels and distribution, delineation of responsibilities for specific managerial actions and policies or procedures to be employed in eight major areas of endeavor. These include organizational structure, aircraft discrepancy validation, production planning, readiness measures, component processing, material flow, component handling and training. In reference (d), it was explained that incomplete implementation of program onboard the USS SARATOGA was due to lack of adequate personnel resources, continual TC 3500 operational problems, lack of adequate space and lack of an effective communications system between AIMD, squadrons, maintenance and supply; yet, continuing support of the program was strongly recommended. The following recommendations were emphasized:

a. VIDSBOARDS should be sequenced by work unit code within AIMD work centers to provide for more efficient production scheduling. A complete repairable deck with primes and interchangeable cross-references from NSN to WUC should be provided by ASO. With the recommended sequence, a complete deck of cards in National Item Identification Number (NIIN) sequence cross reference to work unit code is required.

b. More space is required for the repairable control function to allow for a greater visibility of the repairable assets with demand above a variable threshold (due to constrained display space).

c. Installation of the 9MC should be expedited to improve internal communications.

d. SUADPS data control section should be established within the S-6 division to monitor and edit all SUADPS input and output, and advise the S-6 Division Officer on the status of AVCAL financial and inventory accounts.

e. The most critical positions in the prototype level readiness program were in repairable inventory control. The numerous types of repairable transactions have overwhelmed even the most talented personnel assigned. There is clearly a need to provide automation for this essential function of managing a $60 million dollar in-

ventory of repairable assets. Automation of the repairable inventory system should consider a redundant third generation of CPU with random access, and outlying real time remote devices from Repairable Control, all squadrons and AIMD spaces.

f. Design the prototype level readiness program to gain an incremental (marginal) benefit to aircraft availability by better management of onboard spaces and maintenance capacity and provide adequate personnel to (1) analyze production shortfalls and formulate corrective action, (2) audit all repairable control functions, (3) review maintenance and supply management data for trends and, (4) formulate programs and goals for improvement. Without these functions, little marginal benefit to aircraft availability (regardless of measure of effectiveness) can be expected from the Level Readiness Program.

C2. Implementation of the program was based partly upon the use of an improved communications system for generation of DD Form 1348 requisitions. Operational performance, installation and evaluation are summarized by the following statements:

a. Two Burroughs TC 3500 Data Sets and CRT Displays were installed to send Supply/Maintenance requisition data from squadrons and AIMD work centers to the Repairable Control Center.

b. The system operated only three out of seventeen weeks. When operating, it provided a very legible requisition and the software data validation ensured more complete and correct data elements.

c. The TC 3500 system required an air-conditioned clean environment which was not available. The system should have been shock-mounted to reduce vibration. The system required back-up supply support from Burroughs and either a competent field engineer or better trained naval technicians. Meantime between TC system failures was about ten working days. Naval technicians were never successful in restoring the TC to operation after failure and a Burroughs engineer was required each time the system failed.

d. The TC 3500 associated document printer did not permit immediate access to documents transmitted by customers. When the cover was on the machine, five documents had to be received before the first document could be retrieved. When the machine cover was off, the second document had to be received before the first document could be removed.

e. The TC 3500 was unsatisfactory in almost all respects.

SECTION D

CONDUCT OF THE EVALUATION, RESULTS, AND DISCUSSION

D1. Approach. The approach was based upon collection of data in compliance with a test plan designed to account for improved performance, cost benefits, reliability and maintainability of hardware, suitability of software and the impact upon the operations of the AIMD. Cost data were not compiled because they were not available; however, the compiled operational data can be easily converted to cost data if or when the appropriate elements of cost become available. When it became obvious that cost data were unavailable, part of the effort was channeled into a determination of where SIDMS saved time and how this time was used to improve operations.

D2. Data

D2.1. Installation Manhours and Material. All major equipment was installed in the AIMD Material Control space located on the main deck forward, frame 21, port side. The CRT terminals and printers were dispersed throughout the ship on five decks from bow to stern or port to starboard and interconnected by 26,000 feet of shielded cable. Installation of all wiring and equipment was accomplished by the AIMD and air wing personnel prior to deployment. The installation of the 26,000 feet of wire was performed by a work detail of 13 persons split into two shifts working over a period of 20 days. (The average rate was probably E3). The hardware was delivered and installed in one day. The equipment was not mounted upon shocks. The disk drivers and CPU rested on wheels but were secured to the deck by flanges to prevent rolling.

D2.2 Training. A VAST CET from PRD Electronics, Inc., was given approximately two weeks training in maintenance and operations of SIDMS prior to deployment. He then provided on-the-job training to an AQ1/E6 who was assigned to maintain the complete system. The AQ1/E6 effectively maintained the hardware and pursued a self-established PMS program with satisfactory results.

a. A classroom training course of 0.5 hours was developed to acquaint all users with their terminal and its application. In most instances, work center supervisors attended this course and then provided specific on-the-job training to their designated users. Thirty-six people attended this course which was presented twice. Minimal training was required for use of the system by a seaman, airman, or officer. In fact, most users required no more than 1.5 hours of explanation and practice to become proficient operators. (Regular USS JOHN F. KENNEDY users of SIDMS now include 11 E2s, 39 E3s, 88 E4s, 82 E5s, 53 E6s, 14 E7s, 2 E8s, 1 E9 and 3 Lieutenants).

D2.3 System Operation Time Data. Operator times by work center during the first 184 days of deployment are shown in Table II. Total times were obtained by multiplying the transactions in Material Control (Work Center 050) by 124/3600 and multiplying the transactions of all

other work centers by 100/3600. These multiplication factors are based upon results of timing transactions by stop watch in the Material Control, Precision Measuring Equipment, VA46 and Production Control work centers (See Raw Data Package). The average time per transaction in the last three weeks of these work centers was approximately 100 seconds. It has been assumed that this average transaction time of 100 seconds applies to the remaining work centers.

The total operator time on SIDMS was estimated to be almost 1400 hours expended in completing almost 81,000 transactions. Approximately 15,000 transactions were generation of a DD Form 1348 requisition.

TABLE II
SYSTEM OPERATION TIME

WORK CENTER	NUMBER OF TRANSACTIONS	TOTAL TIME	
		HRS	MINS
020	2448	68	48
050	21293	734	10
410	1818	50	30
510	18668	518	40
540	437	12	09
550	155	4	19
570	177	4	55
610	4253	118	20
620	2035	56	36
630	1237	34	23
640	1071	29	46
645	1962	54	50
650	1175	32	40
655	1214	33	44
670	3812	106	00
690	1243	34	32
710	74	2	02
810	305	8	29
830	377	10	29
900	2904	80	48
SRS	2360	65	40
AWP	2667	74	10
F14	811	22	34
F32	1237	34	24
125	760	21	07
A34	1476	41	40
A46	690	19	10
A72	1046	29	06
F63	377	10	29
S11	1276	35	30
133	484	13	27

D2.4 Unscheduled or Preventive Hardware Maintenance. Unscheduled maintenance and failure history are shown in Table III. Preventive maintenance is shown in Table IV. Parts used or on order are contained in Table V.

TABLE III

UNSCHEDULED MAINTENANCE AND FAILURE HISTORY

UNIT	DATE	ITEM/ACTION/COMMENT	EMT	MMH
Central Processing Unit	2-25-77	Memory Board/Replace IC Chip	3	5
		Memory Board/Reseat	1	1
		Syn Controller/Reseat	.5	.5
Magnetic Tape Transfer Unit	2-14-77	J2 Pin h Wire/Solder	4	4
		Pin Wire/Solder	4	4
		Pin Wire/Solder	4	4
	6-6-77	Capstan Motor Assy/Replace	70	105
Disk Driver	1-25-77	Heads-Disk/Replace	8	20
	6-17-77	Heads-Disk/Replace Head #9, Align Heads, Replace Servo-control Amplifier	50	87
		Spool/Adjustment--Intermittent spooling areas. Problem ignored from 7-4 to 7-8 due to belief a new linear motor was needed. Adjustment of positioning checks eliminated problem on 7-21-77.	12	24
Line Printer	4-8-77	Transistor Tip 31-B/Replace. Diode IN4998/Replace Diode INWG904/Replace, work completed 4-12. Problems were maintenance induced.	40	60
Auxiliary Printer		Printer/Adjustment/Problem of line skipping was eliminated.	1.5	1.5
CRT Terminal	1-21-77	Wire/spliced in two places	3	3
	1-15-77	Capacitors/Solder down	50	50
	3-24	Remote Terminal/Adjust	1.5	1.5
	6-28	Remote Terminal/Adjust/ Broken UP Display	1.5	1.5

TABLE IV

PREVENTIVE MAINTENANCE FOR SIDMS

UNIT	WEEKLY ACTIVITY	TIME (Min)	MONTHLY ACTIVITY	TIME (Min)
Main Computer	Clean filters	5	Wash filters	6
Disk Drivers	Clean air filters	5	Perform weekly	20
	Check for loose fasteners	15	Check belts	8
			Remove platter and clean interior	15
Line Printer	Check ribbon	2	Turn ribbon over or replace	3
	Dust			
	Clean exhaust assembly	25	Lubricate	20
			Disassemble exhaust assembly and clean	30
Card Reader	Clean filter	3	Remove shell and clean interior assemblies	40
Card Punch	Clean bit bucket and platform	10	Clean as in weekly check	10
			Lubricate	35
			Check for loose assemblies	60
Terminal	Clean dust turf	10	Perform weekly	30
	Check f/loose plugs	15	Air clean terminal	60
	Check operation	5	Run "P" RICH	15/30
#33 Printer			Clean type head	3
			Check ribbon	1
			Lubricate	20
			Check operation	15
#35 Printer	Clean type head	3		
	Check ribbon	1		
	Lubricate	20		
	Check Operation	20		

TABLE V

PARTS USED AND ON ORDER

NAME OF PART	PART NUMBER	DATE
Capstan & Taco Assembly		5-29/6-1
Memory Board	44P0769-000	3-23
Disk Unit	2316 (IEM)	1-25
Read/Write Head	91158-004	1-25
Cathode Ray Tube	CE394M12P4515	5-12
Transistors (2)	TIP 31B	4-19
Diode	INWG904 (380100904-1001)	4-19
Capacitor	153U015AB2A	4-19
Relay, Wire Contact	196197/BN38R	6-30
Air Filter Set	90136-001	6-10
Disk Unit	SN/14006	6-17
Memorex Disc	2316 S/N 6006268	6-17

Most preventive or unscheduled maintenance was performed by an AQ1/E6. A contractor engineering technician usually provided assistance and advice on unscheduled maintenance.

D2.5 Contractor Support Data. Extraordinary support provided by the contractor is summarized in Table VI.

D2.6 System Adequacy, Reliability, and Serviceability Data. Data related to system downtime, hardware reliability, and serviceability are contained in Tables III, IV, V, and VI. Additional data on adequacy of system in terms of availability to AIMD for management functions or to all users for generation of DD Form 1348 requisitions are contained in Table VII.

TABLE IV

EXTRAORDINARY CONTRACTOR SUPPORT

NAME	DATES		DAYS
	SOFTWARE	HARDWARE	
E. Heaton	1-26/2-5		10
	3-11/4-2		22
W. Flaig	1-26/1-30		4
	2-17/2-27		10
	4-18/5-8		20
	5-30/6-9		10
J. Whitehead	1-26/1-30		4
	2-17/3-5		16
D. Davis	2-17/3-5		16
	4-18/5-6		18
A. Macias	5-7/5-31		24
J. Shalleen	3-22/4-2		11
B. Zichichi	5-14/5-18		4
G. Barnard		3-9/3-12	3
D. Hill		5-23/5-28	5

Using days as a measure of the effort devoted to hardware or software, approximately 96% of the extraordinary effort was expended on software.

TABLE VII

PERFORMANCE RECORD OF SIDMS

AIMD MANAGEMENT		DD FORM 1348	
DOWN	UP	DOWN	UP
	15 Jan		15 Jan
25 Jan	5 Feb	25 Jan	5 Feb
28 Feb	17 Mar	28 Feb	17 Mar
6 Apr	7 May	20 Apr	23 Apr
14 May	15 May	27 Apr	1 May
18 May	20 Jun	14 May	15 May
		18 May	26 May
		17 Jun	18 Jul

During the first 184 days of deployment, the AIMD management programs were available for 93 days, the DD Form 1348 generation program was available for 109 days and all programs were available for 53 days. Although some downtime was caused by hardware failures and correction of original programming concepts, in general non-availability was primarily due to a software programming problem originally caused by one improper link between the AIMD management programs and the central processing unit. Programming the AIMD management functions was a complex process so that identification of this problem and incorporation of several revisions to correct other minor problems have not been easy tasks; however, much progress has been made. In fact, during this deployment, the AIMD management package was developed to the point that only minor debugging problems remain.

While available to the users, the AIMD management package was used to complete more than 69,000 transactions which provided AIMD management with data needed for allocation of resources and saved many man hours of unnecessary labor. The mere ability to check the status of AIMD assets was, in many instances, an asset used to good advantage. In particular, tracking of personnel by name, rate, berthing area and work center, as well as tracking of engine status by type engine and serial number were capabilities fully exploited by AIMD management.

Incorporation of changes into the AIMD management package did not necessarily reduce SIDMS to a useless state. This is true because

supply support functions were provided independently of the AIMD functions, i.e., while the AIMD management functions were being reprogrammed, DD Form 1348 requisitions could be generated by all work centers.

D2.7 Impact of SIDMS on Supply Response Section. The principal supply support function provided by SIDMS is the generation of DD Form 1348 requisitions in SRS. This process was reviewed or monitored to ascertain whether or not use of SIDMS saved man hours in the generation of a DD Form 1348, how much time was saved and was this time effectively used to reduce supply response time, i.e., the time between the generation of the requisition and a report on status to the originator.

Baseline data for these purposes were obtained using a stop watch to time activities required to prepare a DD Form 1348 or determine status. Activities required to prepare a DD Form 1348 without SIDMS include the following:

1. A telephone call from a remote station to SRS. Caller provides whatever information he has that is relevant to the generation of a DD Form 1348.

2. Receiver fills out a DD Form 1348 using information provided by caller.

3. Receiver of call techs the card, e.g., he cross-references the part number with NSN and other equivalent part numbers and provides storage locations for the parts.

4. Receiver types DD Form 1348 and places it in runner's basket.

With SIDMS, the equivalent activities are:

1. Caller uses a remote terminal of SIDMS to input the information required to identify the part being ordered.

2. SIDMS cross-checks the part number with NSN and alternate part numbers, provides locations for the parts and types the DD Form 1348 in the Supply Response Section.

3. Personnel in the Supply Response Section remove the completed DD Form 1348 and place it in a runner's basket.

With or without SIDMS, the runner picks up the completed forms, checks the locations and returns to the Supply Response Section with the part or the information that the part is NIS. The major difference with SIDMS is that the runner carriers fewer requisitions per trip.

Time data of personnel performing activities to prepare requisitions without SIDMS are contained in Table VIII. Each subject processed exactly two requisitions.

TABLE VIII

MANPOWER ACTIVITES AND TIMES (Seconds) TO PROCESS TWO DD FORM 1348 REQUISITIONS WITHOUT SIDMS

TELEPHONE		TECHING	TYPING
CALLER	RECEIVER		
243	243	726	485
250	250	731	408
394	394	705	616
164	164	470	353
155	155	427	302
192	192	508	213

Based upon these data, the average man time/requisition consumed on the telephone is 232 seconds, the average man time/requisition consumed in teching is 297 seconds and the average man time/ requisition consumed in typing is 198 seconds. In other words, without SIDMS, the average man time/requisition is 727 seconds. With SIDMS the average time consumed by the initiator is 100 seconds if his order goes directly to the Supply Response Section without first going to Material Control. If the order goes to the Supply Response Section via Material Control, the average man time/requisition is 348 seconds. This includes 224 seconds for the initiator and 124 seconds for the relayer in Material Control. From these figures, the average time saved per DD Form 1348 processed by SIDMS is 627 man seconds if the order goes directly to the Supply Response Section. The average time saved is 379 man seconds if the order is transmitted via Material Control. In either case, the average time saved in the Supply Response Section is 611 man seconds per requisition. (Average values using SIDMS are based upon timing of individual transactions in PME, MC, PC and VA46, It is assumed that the average time per transaction in PME, PC and VA46 applies to all remote terminals.)

Status response times and number of requisitions processed per response time in SRS with and without SIDMS are contained in Table IX.

TABLE IX

STATUS RESPONSE TIMES AND NUMBER OF REQUISITIONS
PROCESSED PER RESPONSE TIME IN
SRS WITH AND WITHOUT SIDMS

WITH SIDMS		WITHOUT SIDMS	
Average Response Time (Seconds)	Requisitions Processed	Average Response Time (Seconds)	Requisitions Processed
1654	4	7147	13
1039	1	8932	6
1683	7	5375	7
2282	4	3176	3
2244	3	3480	2
2793	4	2393	4
2062	5	6258	11
1581	4		
1034	2		
745	2		
1765	8		
1209	1		
1538	5		

Obtained by timing a runner in the Supply Response Section with a stop watch, these numbers indicate that use of SIDMS reduces the status reponse time per requisition by approximately 70 minutes (i.e., 6066 seconds minus 1793 seconds.)

D2.8 Performance on Successive Deployments. Measures of performance experienced by the USS JOHN F. KENNEDY on successive deployments to the Mediterranean are contained in Table X. Measures of the last deployment were generated from July 1975 through January 1976. Current deployment covers January through June of 1977.

TABLE X

SUCCESSIVE DEPLOYMENT MEASURES

PERFORMANCE PARAMETERS	VALUES OF PERFORMANCE PARAMETERS	
	LAST DEPLOYMENT	CURRENT
Flight Hours	24,191.	21,110.
OR (%)	48.4	60.7
NORS (%)	25.5	23.8
NORM (%)	26.1	15.5
Items NORS (Avg Day)	399.	222.
Items NFE (Avg Day)	517.	226.
TAT (Days)	6.5	9.5
BCM (%)	29.	21.
RFI (%)	71.	79.
AWP (%)	71.	63.
AWM (%)	21.	26.
SRS Response (Hrs/Unit)	3.5	2.0
Inventory Loss Rate	0.0	0.0
Number of Aircraft	83.	84.
AIMD AWP	752.	630.
AIMD AWM	233.	208.
AIMD WIP	83.	97.
AIMD Backlog	1046.	1072.

In general, performance measures of the current deployment are superior to those of the last deployment. This improved overall performance cannot be solely attributed to SIDMS; however, it may be inferred that SIDMS made a significant contribution by substantially reducing the response time in SRS although the response time of two hours per unit for the current deployment is an estimate based upon sampling rather than the final overall value for the deployment. That SIDMS reduced the response time in SRS is a conclusion attested to by workers in SRS and substantiated by the data in the preceding section.

D3. Results.

D3.1 SIDMS was Easily Installed in the USS JOHN F. KENNEDY. As weights and dimensions of major units are not excessive, installation at other sites should constitute a relatively simple task.

D3.2 Programming was Easily Mastered. With a few simple instructions on calling required programs and entering changes, the typical user mastered the programming within 1.5 hours. This means a formal training program is unnecessary, special instructions or training publications are unnecessary and prior knowledge of computers or programming is unnecessary.

D3.3 Units of Hardware Were Highly Reliable and Easily Maintainable. During the deployment of the USS JOHN F. KENNEDY, SIDMS provided an operational reliability greater than 95 percent. Specific failure histories of the major pieces of hardware are summarized as follows:

D3.3.1 CPU. Three failures were experienced. One was a failure of an IC chip in the Memory Board. Time to identify and correct was three hours. Two other failures were corrected by reseating a circuit board -- one being the Memory Board and the other a SYN Controller Board. Time to identify the problem and reseat the Memory Board was one hour. Identifying the problem and reseating the SYN Controller Board consumed one-half hour. Only one man worked on the problem. These failures downed the entire system for 4.5 hours.

D3.3.2 MTTU. This was a reconditioned unit when received. It experienced four failures. Three were caused by excessive tension in a wire bundle creating intermittent open circuits. Correction time was 12 hours. The last was a power supply failure compounded by the fact that the spare power supply was incompatible with the unit. This problem was resolved by replacing the capstan motor/tachometer assembly with a different assembly which was compatible with the spare power supply. One hundred five man hours of effort were expended during an elapsed maintenance time of 70 hours.

D3.3.3 DISK UNITS. Three problems occurred with the original disk unit. One was a head crash that occurred on 25 January and is believed to have been caused by mishandling of a disk pack. Excessive downtime was encountered awaiting the arrival of a disk alignment pack and disk drive system exerciser. Once the proper equipment arrived, the problem was corrected in eight hours. A second problem of damaged platters was attributed to a second head crash. The time of contact is unknown. Head #9 was replaced, heads aligned and the servo control amplifier replaced. Two men spent 87 man hours on the problem over an elapsed maintenance time of 50 hours. A third problem, characterized by spooling errors and selective locks which was first noticed on 20 July, was easily resolved once the cause was identified. (NOTE: These units are installed in a space which undergoes a tremendous shock with each stroke of the catapult; yet there have been no ill effects on equipment due to vibration).

D3.3.4 CARD READER. No failures.

D3.3.5 LINE PRINTER. No failures. (A downtime of 40 hours was experienced on this unit when it was first disassembled for cleaning. No further problems are anticipated).

D3.3.6 AUXILIARY PRINTERS. These units, 14 in number, have experienced one failure. A problem of line skipping was corrected by adjusting tension on an associated lever. Repair time was 1.5 hours. Individual units were down from time to time for periodic maintenance and adjustment. This maintenance did not contribute much to down time on the system. Future problems with these units are not anticipated as they are highly reliable, fairly rugged and easily maintainable.

D3.3.7 CRT TERMINALS. The 32 terminals had an average down time of 1.5 hours each for corrective action to eliminate a design problem associated with loosening of a large power supply capacitor. Four failures were experienced. Total down time attributable to these failures is 6 hours. As they were energized 24 hours a day, their ability to operate in a shipboard environment is well established.

D3.4 Availability of SIDMS was Satisfactory. Using days available over days of deployment, measures of availability to the AIMD or to Supply or to both the AIMD and Supply are 51 percent, 59 percent and 29 percent, respectively, over the first 184 days of deployment. Primarily due to programming changes, these numbers not only seem to be low, they are low; however, accomplishments during this somewhat limited period of availability easily demonstrate the worth of the system. While available for use, approximately 81,000 transactions were completed. To complete these transactions, nearly 2,400 man hours were consumed in addressing the system. Of these transactions, approximately 15,000 were generation of DD Form 1348 requisitions. Generation of these requisitions saved approximately 2,550 man hours in SRS. This time was advantageously used to reduce the supply response time for parts and thereby contribute to the general improvement in performance achieved by this deployment over the last deployment.

SECTION E

OPERATIONAL APPLICATIONS

E1. Operational Applications Favorable to SIDMS.

E1.1 In the opinion of the representative from the Naval Aviation Integrated Logistic Support Center (NAILSC), ninety-three days of operation of the AIMD status and data management functions demonstrated a real capability for timely management and control of maintenance assets.

E1.2 In the opinion of the Supply Officer on the USS JOHN F. KENNEDY during the Mediterranean deployment of 1977, a positive aspect of SIDMS was its management application to the Component Control Section (CCS). Reports generated in the AIMD effort had direct management application to the Rotatable Pool, Component Control, AWP and Closed Loop Aeronautical Management Program (CLAMP) sections. The overburdened ships computer could not furnish either the daily or monthly data in a timely or accurate manner necessary to the management of a dynamic repairables control program. Through SIDMS, the rotatable pool was able to have Turn Around Time (TAT) and AIMD status data on a regular basis for the purpose of requesting changes in the rotatable pool allowances. The AWP section used SIDMS to control outstanding documents and to ensure matching of documents with the correct Production Control Numbers (PCNs). Through SIDMS, Supply was provided with a track of all repairable assets so necessary in this day of fixed allowances.

E1.3 In the opinion of personnel from AIMD, Supply or Squadrons, automatic cross-indexing of part numbers with NSNs by SIDMS was a real time saver.

E1.4 In the opinion of the representative from NAILSC, most users liked SIDMS. (Initially users fussed because it imposed additional work. After an extended period of use, most users fussed when it was not available).

E1.5 In the opinion of the representative from NAILSC, the working relationship that existed between personnel from Squadrons, Supply or the AIMD was congenial or harmonious when SIDMS was operational. They were less congenial when SIDMS was not operational.

E1.6 Use of SIDMS raised the efficiency and reduced the response time of SRS by uniformly distributing the workload and eliminating human error in copying, teching and typing.

E1.7 Adverse effects on equipment or operations because of the environment were not observed; however, no stormy seas were encountered.

E1.8 Initially, many security measures were designed into SIDMS to ensure accuracy of data and errorless manipulation of data by operators. Because the number of transactions per day frequently exceeded the number originally anticipated by a large amount (i.e., 3000 versus 300), it became necessary to choose between security measures and transaction speed in many instances. Usually, the selected option was transaction speed and establishment of procedures based upon self-discipline to safeguard information, i.e., current programming is geared to high transaction speeds.

E1.9 A background/foreground mode of operation was not part of the original concept for SIDMS; however, the need for this feature was quickly recognized once the time of printing records was noted. SIDMS was then modified to provide a quasi-background/foreground mode of operation which was used to complete as many as 5,000 transactions per day. (The originally anticipated number of transactions per day was 300).

E1.10 Programming safeguards to ensure no response to incorrect sequencing of operational instructions along with a warning message that no action was taken due to a faulty entry, as originally implemented, proved to be inadequate. The results of selective programming changes later incorporated is that the system no longer responds to incorrect sequencing.

E2. Operational Applications Unfavorable to SIDMS.

E2.1 This was a quick response project because of a requirement to evaluate the performance of SIDMS during an imminent deployment. The design of the software package was a complex process that was terminated one and one-half hours prior to deployment. The system had not been debugged and the result was that truly minor debugging problems blossomed into major operational problems during the first four months at sea. It is believed that constant liaison by cognizant naval personnel during the software concept formulation phase would have eliminated many of these problems in the early design stages. Installation of future systems should include continuing liaison between the Navy and the contractor through the early stages and onboard software representation by the contractor for at least the first two months of deployment, if not the entire cruise.

E2.2 The capability to insert large amounts of data without terminating services to users for excessive periods of time is a necessity.

E2.3 While the magnetic tape transfer unit was a reliable piece of hardware, its operational integrity was somewhat less than spectacular. A recurring problem with this unit was a tendency to write and verify tapes that contained parity errors after only two or three days of storage. No satisfactory explanation for this phenomenon was ever discerned.

E2.4 Features of SIDMS that should be changed to decrease the average transaction time include the polling procedure and the output line printer. The sequential polling procedure causes as much as a forty-five second delay between the time a user initially addresses a terminal and the time he is recognized. The output rate of the line printer is sixty lines per minute. This rate is well below the current state-of-the-art in line printers.

E2.5 A backup data system should be provided to minimize loss of data or programs during a head disk crash. The system should consist of a duplicate set of disks and two tape units. One tape unit should be dedicated to utility cases, i.e., sorts, data and inputs. The second unit should be used as a log of daily transactions. At the end of each day of operation, the alternate set of disks should be installed and the log file tape should be read into the newly installed disk to bring them up-to-date. When a disk crash or failure occurs, the maximum loss would consist of only one day of transactions.

Items E2.1 through E2.5 are opinions shared by the NAILSC representative and officers of the AIMD onboard the USS JOHN F. KENNEDY.

E2.6 The opinion of the NAILSC representative is that SIDMS should be a valuable asset both ashore and afloat once the shortcommings identified in sections E2.2 through E2.5 have been corrected.

SECTION F

CONCLUSIONS

Conclusions which have been identified or implied in previous discussions, along with the identity of supporting sections contained in parentheses, are listed below.

1. The hardware was reliable (D2.4, D3.3).
2. Installation of SIDMS was a relatively simple process. (D2.1, D3.2).
3. Users easily mastered the programming procedures. (D2.2, D3.2).
4. Operational availability to users was adequate. (D2.6, D3.4, E1.1).
5. SIDMS had a favorable impact upon operations. (D2.7, D2.8, E1.2, E1.3, E1.4, E1.5, E1.6, E1.9).
6. SIDMS was seaworthy. (E1.7).
7. Contractor provided extraordinary support to software and hardware. (D2.5, E1.8, E1.9, E1.10).
8. Navy provided maintenance support. (D2.4).
9. Procedure to input data should be changed. (E2.2).
10. The magnetic tape transfer unit should be changed. (E2.3).
11. Efforts should be made to reduce the average time per transaction. (E2.4).
12. The printing rate should be increased. (E2.4).
13. Better methods of maintaining integrity of data should be incorporated. (E2.3, E2.5).

A major conclusion based upon conclusions 1 through 6 is:

SIDMS is worth keeping aboard the USS JOHN F. KENNEDY.

A major conclusion based upon conclusions 7 and 8 is:

SIDMS needs logistic support.

A major conclusion based upon conclusions 9 through 13 is:

SIDMS should be modified.

SECTION G

RECOMMENDATIONS

G1. Modification Recommendations.

G1.1 Continue debugging the AIMD management routines until all minor deficiencies are eliminated.

G1.2 Incorporate a line printer with a printing rate at least as great as 200 lines per minute.

G1.3 Modify SIDMS to increase the transaction speed. This can be accomplished by modifying the polling routine (i.e., incorporate a priority interrupt method or poll based upon usage frequency per terminal) or by incorporating a communications executive type program. The latter is the better of these alternatives.

G1.4 Replace the MTTU with a new, different and better unit.

G1.5 Install a second MTTU and add two disks to provide a back-up data system.

G2. Support Recommendation. Negotiate a logistic support contract with the contractor to provide hardware repair capability and software modifications capability or appropriate training of naval personnel to provide each capability until the end of the next Mediterranean deployment by the USS JOHN F. KENNEDY.

G3. Final Recommendation. Either procure or continue leasing the equipment aboard the USS JOHN F. KENNEDY and enter negotiations to include the recommendations for modification and support.

With the recommended support and incorporation of the modification recommendations, SIDMS should be an asset ashore and afloat.

RAW DATA PACKAGE

TRANSACTION TIMES ON SIDMS

THROUGH ACTIONS TIME (Secs)	LOCAL ACTIONS TIME (Secs)
129	102
193	145
293	110
45	90
121	180
40	90
84	132
132	157
210	61
134	113
240	83
112	112
130	25
112	200
59	218
77	182
57	57
147	90
191	82
129	43
117	313
149	178
94	64
111	139
129	133
129	212

DATE: 5-16-77
PLACE: MC
PAY GRADE: E9

TRANSACTION TIMES ON SIDMS

THROUGH ACTIONS TIME (Secs)	LOCAL ACTIONS TIME (Secs)
43	84
134	105
235	95
118	137
41	205
66	141
121	91
127	156
204	149
63	87
115	122
155	153
87	164
44	102
157	55
60	81
121	185
86	90
118	69
205	113
115	198
42	157
176	78
182	139
65	146

DATE: 5-17-77
PLACE: MC
PAY GRADE: E5

TRANSACTION TIMES ON SIDMS

THROUGH ACTIONS TIME (Secs)	LOCAL ACTIONS TIME (Secs)
121	131
186	140
235	106
41	69
118	174
287	189
42	94
83	138
124	104
127	85
204	176
129	87
138	155
119	60
65	121
82	90
61	118
150	87
193	115
130	42
117	192
86	111
106	176
123	52
122	86
78	100

DATE: 5-8-77
PLACE: MC
PAY GRADE E4

TRANSACTION TIMES ON SIDMS (INPUT)

TIME (Secs)	TIME (Secs)
98	103
90	75
122	137
111	91
115	104
71	105
102	202
99	106
89	122
143	110
95	111
93	119
42	99
156	81
106	86
104	92
89	98
114	124
89	108
121	118
172	55
79	99
86	124
59	81
80	84
51	106

DATE: 5-8-77
PLACE: AC
PAY GRADE: E4

. TRANSACTION TIMES ON SIDMS

TIME (Secs)	TIME (Secs)
50	203
80	105
60	103
88	89
82	134
177	71
125	87
87	107
116	111
92	121
108	108
110	115
159	94
41	82
94	118
95	85
142	90
87	95
97	120
101	103
71	100
115	55
112	123
124	79
93	81
102	102

DATE: 5-16-77
PLACE: PC
PAY GRADE: E3

TRANSACTION TIMES ON SIDMS (INPUT)

TIME (Secs)	TIME (Secs)
50	100
106	102
102	55
99	81
89	123
80	79
202	101
106	94
122	97
60	95
103	87
89	142
110	122
111	81
88	99
134	110
143	119
95	111
99	98
82	71
71	115
86	90
92	122
93	111
98	104
177	106

DATE: 5-17-77
PLACE: PC
PAY GRADE E4

TRANSACTION TIMES ON SIDMS

TIME (Secs)	TIME (Secs)
78	86
54	121
82	87
83	91
88	97
62	123
94	107
87	103
118	57
84	124
100	83
180	83
96	103
129	45
52	97
91	98
121	143
118	83
76	94
95	99
80	70
109	119
100	115
112	126
117	94
95	106

DATE: 6-17-77
PLACE: VA46
PAY GRADE: E5

DATE: 6-17-77
PLACE: PME
PAY GRADE: E5

TRANSACTION TIMES ON SIDMS (INPUT)

TIME (Secs)	TIME (Secs)
47	99
99	98
99	85
145	196
89	131
98	69
101	106
70	98
113	108
118	113
129	124
97	111
105	117
161	96
108	80
108	101
91	79
114	76
93	119
130	50
181	117
85	72
90	118
61	94
80	90
49	86

DATE: 6-17-77
PLACE: VA46
PAY GRADE: E5

DATE: 6-17-77
PLACE: PME
PAY GRADE: E5

MONTHLY RECORD OF TRANSACTIONS

WORK CENTER	MONTH							WORK CENTER TOTAL	TOTAL
	JAN	FEB	MAR	APR	MAY	JUN	JUL		
020	481	16	449	229	163	584	584	2449	2449
050	1035	114	1522	2009	4795	6208	5610	21293	23742
410	117	1	124	96	735	360	335	1818	25560
510	747	313	1109	1900	4768	5176	4655	18668	44228
540	49	3	69	54	96	77	89	437	44665
550	49	0	8	42	49	3	4	155	44820
570	48	0	13	15	19	43	39	177	44997
610	478	8	158	913	1503	627	566	4253	49250
620	319	14	60	256	1031	192	173	2035	51285
630	125	5	59	81	482	274	211	1237	52522
640	136	0	60	74	337	244	220	1071	53593
645	118	0	346	230	576	390	352	1962	55555
650	113	1	36	60	472	259	234	1175	56730
655	212	5	127	173	305	206	186	1214	57944
670	323	2	17	525	578	1243	1124	3812	61756
690	86	18	77	122	585	292	263	1243	62999
710	21	1	1	5	38	0	8	74	63073
810	70	0	22	20	125	41	37	305	63378
830	76	1	0	23	100	93	84	377	63755
900	352	0	24	603	257	1529	139	2904	66659
SRS	205	98	3	185	586	685	618	2360	69010
AMP	550	34	0	46	113	1011	913	2667	71677
F14	34	227	24	58	163	161	145	811	72488
F32	48	253	30	134	198	161	146	970	73458
S32	81	271	56	74	355	210	190	1237	74695
125	34	316	40	45	197	67	61	760	75455
A34	89	342	155	226	346	168	152	1476	76931
A46	27	239	36	72	146	89	81	690	77621
A72	54	207	24	127	223	160	145	1046	78667
F63	53	105	5	41	103	37	33	377	79044
S11	87	449	1	88	422	120	109	1276	80320
133	30	101	9	63	83	104	94	484	80804

STATUS, INVENTORY, DATA MANAGEMENT AND SUPPLY SUPPORT SYSTEM EVALUATION PLAN

TABLE OF CONTENTS

LIST OF ACRONYMS AND ABBREVIATIONS

AIMD	Aircraft Intermediate Maintenance Department
ASMRA	Adjustment of Scheduled Maintenance Requirements through Analysis
AWM	Awaiting Maintenance
AWP	Awaiting Parts
BOA	Basic Ordering Agreement
CPU	Central Processing Unit
CRT	Cathode Ray Tube
EMT	Elapsed Maintenance Time
IMA	Intermediate Maintenance Activity
JCN	Job Control Number
MAF	Maintenance Action Form
MOS	Metal Oxide Semiconductor
MSOD	Maintenance Support Office Department
NAILSC	Naval Aviation Integrated Logistic Support Center
NFE	Not Fully Equipped
NORS	Not Operationally Ready, Supply
OR	Operational Readiness
PCN	Production Control Number
RFI	Ready For Issue
SIDMS	Status, Inventory, Data Management, and Supply Support System
SRA	Shop Replaceable Assembly
TAT	Turn Around Time
WRA	Weapons Replaceable Assembly

SECTION 1

PURPOSE OF THE PROJECT

101. Purpose. The purpose of this evaluation is to assess the value of the Status, Inventory, and Data Management System (SIDMS).

102. General Objectives. The general objectives are to:

a. Measure the system's capability to provide timely management reports to the AIMD Officer, Production Control, Material Control, Work Centers, Supply Response Section and squadron Maintenance Officers.

b. Measure the worth of benefits received.

c. Measure the cost of the system.

d. Measure the impact on operational parameters such as OR rate, NORS rate, NFE rate, sorties flown, sortie rate, flight hours, etc.

e. Measure the reliability and maintainability from both a hardware and a software standpoint.

103. Limitations to Scope. Inasmuch as the system is designed to provide maintenance and supply management and supervisory personnel with timely and accurate information but cannot control what use is made of the information it must be recognized that impact on the operational parameters is also a function of what use the management/supervisory personnel make of the information. Furthermore, there are many other factors which may change and over which there is no control which also impact the operational parameters.

SECTION 2

DESCRIPTION OF MATERIAL

201. General. The SIDMS is a data retrieval system designed to provide the AIMD Production Control Shop and the serviced work centers with current and accurate information related to Production Control Status, AIMD Ship Equipment Inventories, etc. The system also provides the automatic cross reference from part number to national stock number and automatic printing of DD 1348 requisitions from AIMD and the squadrons. The information in the files maintained is at the discretion of the user. Storage, retrieval and update of files will be accomplished in an interactive environment using functional mnemonics entered via the CRT and keyboard. Hard copy of selected data is available upon request via the line printer.

202. System Equipments. The following equipments comprise the system and are located in the areas indicated.

202.1 AIMD Material Control

a. Central Processor Unit (CPU) – PRD Mod No. 1210-1000 which includes computer with I/O and 64K of MOS memory (16 bit words).

b. Disk unit with 11.7 million 16 bit word storage capacity.

c. Magnetic Tape Transport Unit 556/880 bpi, 32 IPS.

d. Serial Printer 164 cps 132 col.

e. Card Reader 300 cpm.

f. Key Punch.

g. CRT Terminal PRD Mod No. 1210-4010

h. Video Monitor PRD Mod No. 1210-6010.

i. Auxiliary Printer PRD Mod No. 1210-5020.

j. Line Printer.

202.2 Production Control.

a. CRT Terminal PRD Mod No. 1210-4010.

b. Video Monitor PRD Mod No. 1210-6010.

c. Auxiliary Printer PRD Mod No. 1210-5020.

202.3 AIMD Work Centers (21)

a. CRT Terminal PRD Mod No. 1210-4010.

202.4 Supply Response Section.

a. CRT Terminal PRD Mod No. 1210-4010.

b. Form Printer PRD Mod No. 1210-5030.

202.5 Squadron Maintenance Offices (10).

a. CRT Terminal PRD Mod No. 1210-4010.

b. Auxiliary Printer PRD Mod No. 1210-5020.

SECTION 3

PREVIOUS WORK AND BACKGROUND

301. Previous Work. A similar effort was conducted aboard the USS SARATOGA in 1975, the intent of which was to improve aviation repairables management afloat. The project aboard the SARATOGA was much broader in scope than the current task on the USS KENNEDY. The USS KENNEDY task however, provides much more in the area of automated data retrieval and real time tracking of components under repair through the AIMD. Results of the SARATOGA project are not yet available.

302. Background. In April 1976 the Commanding Officer of the USS KENNEDY requested that an AIMD, Status, Inventory, and Data Management System be installed aboard the USS JOHN F. KENNEDY. This letter was favorably endorsed by the Commander U. S. Naval Air Forces, Atlantic Fleet. Subsequently the Chief of Naval Material (MAT-041) negotiated a contract with PRD to provide the SIDMS to the USS KENNEDY. The task was later expanded to include supply support features. The Naval Aviation Integrated Logistic Support Center (NAILSC) was tasked to monitor the installation of the SIDMS and to assess its value.

303. Bibliography.

a. Commanding Officer USS JOHN F. KENNEDY (CV67) letter 4790 Ser 1254 dated 28 April 1976 with endorsement.

b. Statement of Work for AIMD SIDMS.

c. Contract N00019-76-A-0369, BOA Item 0005 AL.

d. PRD system description titled AIMD Status, Inventory, Data Management and Supply Support System dated 10 September 1976.

e. Scenario for equipment operations.

SECTION 4

SUPPORTING ACTIVITIES INVOLVED

401. Developing Agency. The Naval Material Command Headquarters is the Developing Agency and is responsible for:

a. Administering all contractual requirements.

b. Providing any necessary high level support.

402. Prosecuting Agency. Commander, Naval Aviation Integrated Logistic Support Center (COMNAILSC) is responsible for prosecution of the project and will:

a. Monitor and ensure that project milestones are met.

b. Assess the capability of the SIDMS to provide accurate, timely management information.

c. Determine if the information provided is really necessary and if there is some necessary information which is not provided.

d. Determine and document any savings that might accrue.

e. Determine if personnel/organizations and only those personnel/organizations with a need to know have access to the data.

f. Determine if the equipment required is the minimum necessary to provide the required data.

403. Conduct of At-Sea Tests. Commanding Officer, USS JOHN F. KENNEDY is responsible for the conduct of the test.

SECTION 5

OPERATIONAL PLAN

501. Project Operations. A representative from the NAILSC will accompany the USS KENNEDY during the SIDMS evaluation to assist in the data collection, to analyze the data, and to draft the Final Evaluation Report required by paragraph 801.d of this evaluation plan. Procedures for use of the equipment are spelled out in the scenario.

SECTION 6

DATA COLLECTION

601. Purpose. The purpose of this section is to define the data requirements to enable the value of the SIDMS to be determined. There are three primary categories in which data must be collected. These are:

a. Resources Required/Expended.

b. Equipment Adequacy, Reliability, and Serviceability.

c. Operational Impact.

602. General Procedure. Data will generally be collected by the NAILSC representative assigned to the USS KENNEDY either on forms devised by the NAILSC evaluation team or other appropriate form (e.g., single copy MAF).

603. Data Requirements.

603.1 Resources Required/Expended.

603.1.1 Purpose. The data to be collected is related primarily to the resource consumption incurred during the operations and support of the SIDMS and the data collection technique is structured to impose minimum impact on the normal shipboard activities of maintenance and support of aircraft.

Data to be collected is in the areas of:

a. Installation Manhours and Material.

b. Training.

c. System Operational Manhours.

d. Regular and Preventative Hardware Maintenance Manhours and Material.

e. System Hardware/Software Modification Manhours and Material.

A separate data recording form has been structured for each area. The circumstances for use of each recording form and the data to be recorded is delineated in the following paragraphs.

603.1.2 Data Recording Forms.

603.1.2.1 Installation Data. The resources (i.e., manhours and material) associated with the installation of the AIMD SIDMS hardware shall be recorded. These data shall be collected on a per occurance basis using the format of figure 1 or any

INSTALLATION DATA

MANHOURS

DATE	RATE/RATING	HOURS EXPENDED

MATERIALS

DATE	NOMENCLATURE	AMOUNT (UNITS)

Figure 1

appropriate recording format devised for shipboard use. The significant data elements which must be recorded are:

a. Date of resource expenditure.

b. Manhours expended by rate/rating.

c. Materials consumed by nomenclature and amount.

603.1.2.2 Training Log Data. The resource expenditure for formal training of shipboard personnel in the operations and maintenance of the SIDMS must be recorded. The data collection format is specified in figure 2. If an appropriate recording format has already been devised for shipboard use, it may be used instead of the format of figure 2, but must make the figure 2 data elements available. These data elements shall record:

a. Date of training session.

b. Start/stop time of training session.

c. Instructor(s) and rates/rating(s).

d. Participants by rate/rating and by work center assignment.

603.1.2.3 System Operation Time Data. The system operation time data record is intended to capture the manhours devoted to operational use (i.e., input and output of data) of the SIDMS. Data elements required are:

a. Date of utilization.

b. Work center.

c. Rate/rating of individual utilizing system.

d. Name of individual.

e. Time on system.

The format for recording these data elements is figure 3. If an appropriate form has been developed for shipboard use it may be utilized in lieu of figure 3. An acceptable alternative to recording actual clock time for each use is to determine an average time per transaction per terminal over a set period of time (10 days of operations) and the number of transactions per terminal. To determine the average time per transaction, the format of figure 3 should be used except that data relating to Rate/Rating and name may be deleted. The format of figure 3a is to be used to obtain the additional data on a monthly basis.

TRAINING LOG DATA

DATE _____

TIME: START _____ END _____

INSTRUCTOR _____ RATE/RATING _____

NAME	RATE/RATING	WORK CENTER

Figure 2

SYSTEM OPERATION TIME DATA (DAILY)

DATE	WORK CENTER	RATE/ RATING	NAME	SYSTEM TIME	
				HR	MIN

Figure 3

SYSTEM OPERATION TIME (AVERAGE)

DATE	WORK CENTER	AVG TIME/ TRANSACTION	#TRANSACTION	TOTAL TIME

Figure 3a

603.1.2.4 Regular or Preventive Hardware Maintenance. The resources (i.e., manhours and materials) consumed during regular or preventive maintenance of the SIDMS hardware by shipboard personnel must be recorded. The data collection format suggested is shown as figure 4. Data elements required are:

a. Date of maintenance.

b. Equipment model number.

c. Equipment nomenclature.

d. Part number of repaired item.

e. Quantity of material (spares/repair parts) utilized.

f. Manhours expended in repair action.

g. Rate/rating of personnel accomplishing repair action.

The data associated with repair actions should be extended to include the cost of material consumption per repair action, if available. If the shipboard maintenance plan calls for the assignment of control numbers (i.e., PCN or JCN) to each repair action, the control number should also be included as a data element. If an appropriate form has been structured for shipboard use it may be utilized in lieu of figure 4, but should provide the data elements of figure 4.

603.1.2.5 Contractor Support Data Report. The data related to the provision of contractor support which exceeds (is outside) the scope of contractual requirements shall be recorded. The circumstance for which a contractor support data report shall be required are those occasions when tasks exceeding the scope of work and task descriptions of the statement of work are accomplished by the contractor. This circumstance includes modification/repair of hardware and/or software whether navy intiated (separately funded) or contractor initiated as long as it applies to the USS KENNEDY system. The Contractor Support Data Report shall be structured as per figure 5 and shall provide all of the data elements of figure 5.

603.2 System Adequacy, Reliability, and Serviceability.

603.2.1 Purpose. The purpose of this section is to state the data requirements relating to adequacy, reliability, and serviceability of the SIDMS.

603.2.2 Data Requirements.

603.2.2.1 Hardware/Software Downtime Report. The data related to the system downtime (other than regular or preventive hardware maintenance) caused by a failure of the computer hardware, computer operating system software, application software, or application data bases shall be recorded. The failure of specific hardware and software may cause the system to be considered inoperable, either

REGULAR OR PREVENTIVE HARDWARE MAINTENANCE

ACTION DATE	*CONTROL NUMBER	EQUIPMENT		SPARES/RPP PARTS			LABOR HOURS	
		MODEL#	NOMEN	P/N	QTY	COST*	MAN/HRS	RATE/RATING

*If utilized or available

Figure 4

CONTRACTOR SUPPORT DATA REPORT

DATE: START _____ END _____

FUNDING DOCUMENT: TYPE _____ NUMBER _____

TOTAL EXPENDITURE AMOUNT: $ _____

PURPOSE OF SUPPORT: PERCENT OF EFFORT TO:

- ☐ OPERATING SYSTEM SOFTWARE _____
- ☐ APPLICATION PROGRAM SOFTWARE _____
- ☐ HARDWARE MODIFICATION/REPAIR _____

NARRATIVE DESCRIPTION OF SUPPORT PROVIDED:

Figure 5

wholly or partially, to the intended users. In those cases it will be necessary to record information with regard to the impact of the hardware and/or software failure on system reliability. The data report shall be structured as per figure 6 and shall provide the data elements of figure 6 as appropriate.

Failed items are the actual hardware and or software items that caused the system failure. Hardware shall include all centrally located mainframe hardware and peripherals, and all remote peripherals that contributed to the failure and all remote peripherals and terminals that were inoperative as a result of the failure. Software shall include all operating system software, data base management system software, and applications software.

The total downtime shall be that period of time that the system or subsystem failed until it was back in operation. "Actual maintenance time" is that period of time that maintenance was being performed. These times will be recorded in hours and the fractional part of an hour rounded to the nearest tenths. Work center shall be the actual work center(s) that were rendered inoperative as a result of the failure. The "comments" shall be used to further define the downtime situation. As an example, to comment on the situation in which only part of a data base was down as opposed to the entire data base.

603.2.2.2 Subjective Report. This report is intended to allow the system users to express their views in a narrative format of the system. For instance they can report any problems encountered in its use, and provide answers to such questions as:

a. Does it provide the data needed? If not, what else should be provided?

b. Is there any data provided which is not required? If so, what?

c. Did the system improve or impede the operations of their respective work center? How?

d. Was the information available when needed?

603.3 Operational Impact.

603.3.1 Purpose. The purpose of the data required in this section is to assess the impact of SIDMS on the material readiness of the squadrons deployed aboard the USS KENNEDY and upon the effectiveness and efficiency of the AIMD.

603.3.2 Baseline Data. The Aviation 3-M Summaries for the period of July - December 1975 (last Med cruise), the end of cruise reports that were prepared by AIMD and Air Wing, MSOD reports on the repairable programs, and ASMRA for the above time frame will be utilized to establish baseline data on:

a. Flight Hours.

b. Sorties Flown.

c. Sorties Rate.

HARDWARE/SOFTWARE DOWNTIME REPORT

ACTION DATE	FAILED PARTS					WORK CENTER	TOTAL DOWN-TIME	ACTUAL MAINT. TIME	COMMENTS
	HARDWARE		SOFTWARE						
	MODEL#	NOMEN	PROG NAME	DATA BASE NAME	DESC.				

Figure 6

d. Ready For Issue (RFI) rate.

e. Turn Around Time (TAT).

f. Awaiting Parts (AWP).

g. Awaiting Maintenance (AWM).

h. Elapsed Maintenance Time (EMT).

i. Operational Ready (OR).

j. Not Operational Ready Supply (NORS).

k. Not Fully Equipped (NFE).

l. Man Hour per RFI unit expenditure.

603.3.3 SIDMS Cruise Data. The same sources for data will be used for this cruise as was used to establish the baseline. In addition, two sets of monthly summaries, one prepared in the conventional way and one printed out by the SIDMS, will be forwarded to the NAILSC (ILS500) each month. Documented thereon will be the preparation time of each in man-hours. Furthermore at least ten items, randomly selected, will be validated for accuracy on each of the reports and the errors found shall be documented.

NOTE: It is also intended to document the repairables lost to management visibility for last cruise and this cruise. Procedures will be developed by the NAILSC representative assigned to the USS Kennedy in conjunction with the Aviation Intermediate Maintenance Officer.

SECTION 7

THE ANALYSIS PLAN

701. General. The analysis of data generated during the trial operation of SIDMS will be done in three areas; operational, cost, and hardware suitability. In addition, a subjective analysis of the system will be made.

702. Assumptions. The following assumptions apply:

a. The operational environment during this Mediterranean Cruise (January 1977 – August 1977) is basically the same as that for the previous Mediterranean Cruise (July 1975 – December 1975).

b. The composition of the Air-Group is the same for both cruises.

c. The procedures utilized in conducting day-to-day operations are unchanged except as caused by the SIDMS installation.

d. Turnover of key personnel between the two cruises has not been inordinately great.

703. Operational Data. The data as listed in paragraph 603.3.2 collected for the July 1975 – December 1975 cruise will be compared with the same data collected for the January 1977 – August 1977 cruise to determine if there is any change which may be attributed to the use of SIDMS. The data will be presented in tables and graphs for ease of comparison.

704. Cost Data. From the data required by paragraph 603.1, the total cost for obtaining the system and operating it for a period of approximately 7-½ months will be determined. This then will be compared with the operational data to perform a cost-benefit analysis.

705. Hardware/Software Suitability. The data in this area will be analyzed to determine the reliability and maintainability of the hardware, the suitability of the software, and the impact on the operation of the AIMD as a result of a failure of the system.

706. Subjective. A subjective analysis of all the data, including the subjective report, will be made to determine how the system can be enhanced from a cost-benefit view. That is, an assessment will be made of how the system was used and the data it contained to evaluate the potential for obtaining a greater benefit versus cost.

SECTION 8

REPORTS

801. Reports required in connection with this project are listed below:

a. 3-M Monthly Summaries. The Commanding Officer, USS KENNEDY shall submit the 3-M Monthly Summaries to the NAILSC (Attn: ILS500) on a monthly basis as specified in section 603.3.

b. Technical Assistance Requirement. The Commanding Officer, USS KENNEDY shall submit, via naval message, th the NAILSC (Attn: ILS500) a report of the requirement for technical assistance from a PRD technical representative on each occurance thereof. The report shall specify the nature of the problem, the length of time the system is inoperative, and its effect on IMA operations.

c. Material Failure Report. The Commanding Officer, USS KENNEDY shall submit a report, via naval message, to the NAILSC (Attn: ILS500) of all SIDMS SRAs returned to the factory for repair. The report shall specify the SRA, the WRA from which it was removed, the impact on the operations of the IMA, and the total time the system was inoperative.

d. Final Evaluation Report. The Commander, Naval Aviation Integrated Logistic Support Center shall submit a Final Evaluation Report to the Commander, Naval Material Command (MAT-041) via the Commander, Naval Air Systems Command (AIR-411). The Final Evaluation Report shall contain, as a minimum, a copy of the evaluation plan, the data collected during the evaluation, a description of the data collection and data reduction processes, conclusions reached, and recommendations for changes to the system and whether or not the system should be retained aboard the USS KENNEDY. Recommendations will also be made as to the suitability of the system, with or without modifications, for export to other aircraft carriers or shore stations.